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PROPOSED STAFFING REQUIREMENTS FOR BASE LEVEL SUPPORT SERVICE (BSS)

by

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September 1995

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The Naval Supply Systems Command (NAVSUP) and the Fleet Industrial Supply Center (FISC) have recently commissioned a study on base level computing (BLC). The purpose of which was to determine how to focus their BLC resources. This was in response to recent mission changes for both NAVSUP and the FISC. Although this study addressed in some detail the technological structure of the client-server systems that NAVSUP and the FISC intend to establish, it did not address the staffing of the lowest level base resources used by the FISC. The intent of the FISC is to establish a client-server LAN operation in support of BLC. The method used to determine the staffing needs of a typical operation to support BLC was to survey operations already established at four example sites. Three of these sites are government operations, one of which is an existing FISC. This FISC is currently tranisitioning to the new missions of inventory management and consumable supply support. Results of the survey of these four LAN operations, the two most important factors in determining the ratio of support personnel to end users is the standardization of software and hardware of the system, and the degree that the system is open or closed. Closed and standard systems require much less support than open systems.

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PROPOSED STAFFING REQUIREMENT FOR BASE LEVEL SUPPORT SERVICE (BSS)

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ABSTRACT

The Naval Supply Systems Command (NAVSUP) and the Fleet Industrial Supply Center (FISC) have recently commissioned a study on base level computing (BLC). The purpose of which was to determine how to focus their BLC resources. This was in response to recent mission changes for both NAVSUP and the FISC. Although this study addressed in some detail the technological structure of the client-server systems that NAVSUP and the FISC intend to establish, it did not address the staffing of the lowest level base resources used by the FISC. The intent of the FISC is to establish a client-server LAN operation in support of BLC.

The method used to determine the staffing needs of a typical operation to support BLC was to survey operations already established at four example sites. Three of these sites are government operations, one of which is an existing FISC. This FISC is currently tranisitioning to the new missions of inventory management and consumable supply support.

Results of the survey of these four LAN operations, the two most important factors in determining the ratio of support personnel to end users is the standardization of software and hardware of the system, and the degree that the system is open or closed. Closed and standard systems require much less support than open systems.

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I. INTRODUCTION

A. BACKGROUND OVERVIEW

The Naval Supply Systems Command (NAVSUP) and the Fleet and Industrial Supply Center Norfolk (FISC) sponsored a project that focused on Base Level Computing (BLC). The purpose of this project known as the BLC Support Services Project (BSS) was to determine how FISC Norfolk should focus their BLC resources. [Ref. 1]

An additional purpose of this project was to respond to the recent mission change for NAVSUP and the FISC with the movement of major functions to Department of Defense Agencies. In 1992, information processing was moved to the Defense Information Systems Agencies (DISA)/Mega Center (DMC). The DMC assumed responsibility for the mainframe computer systems, the computer applications, as well as the support personnel. Warehousing and transportation functions were moved to the Defense Logistics Agency Distribution Depot (DLA) and Financial Management was moved to the Defense Finance and Accounting Service (DFAS). These are major changes in the mission of NAVSUP and the FISC. This leaves only the core missions of Inventory Management and consumable Supply Services as shown in Figure 1. Old computer equipment, applications, and communication resources of very large capacity are still in use at DISA, the FISC and NAVSUP organizations. These resources do not adequately support the current mission of the FISC and NAVSUP [Ref. 1]. In addition, some of the computer equipment used at the DISA level has long been obsolete having been purchased in the beginning of the 1970's [Ref. 1]. This obsolescence limits NAVSUP's ability to manage and reduce inventories at the regional level which is now one of its primary missions. Because of the obsolescence and the design era of these computer systems, the information technology resources of NAVSUP are limited in their ability to communicate with more modern software or hardware. NAVSUP and the FISC have

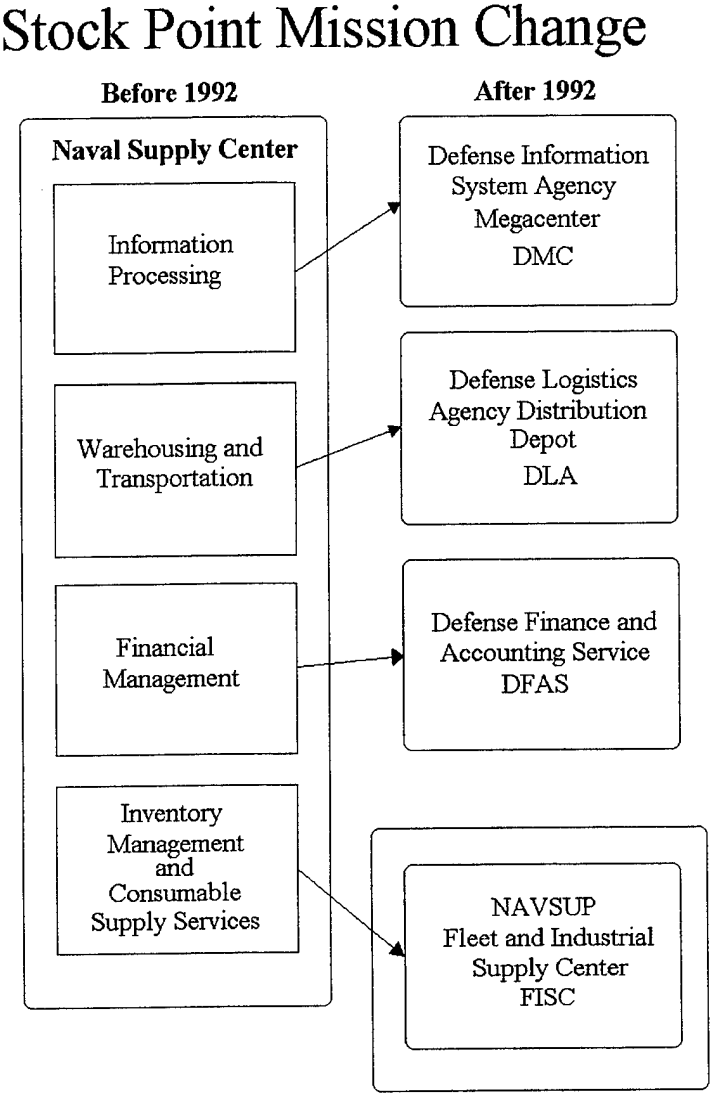

Figure 1. Stock Point Mission Change After Ref. [1].

been adversely affected by these obsolete systems and have had difficulty supporting their customers' current needs. Institutionally, NAVSUP and the FISC have found it cumbersome to support their new regional management requirements [Ref. 1].

To summarize the BSS project, based on this new environment, NAVSUP and the FISC intend to reorganize their computer resources into three tiers shown in Figure 2. Tier I will be made up of the mainframe processors with very high speed networks and

direct communication with each other (these reside at DISA); Tier II will be made up of Database Management Systems (DBMS) servers which will be connected to the mainframe processors and hold the database used by NAVSUP and FISC; Tier III will be the Local Area Networks (LAN), and desktop workstations used by the FISC in the regional supply area. This change should lead to an upgrade in hardware and software at the Tier II and Tier III level. With the emergence of very powerful technologies for desktop computers, NAVSUP has determined that it is time to migrate mainframe applications that are currently running on Tier I computers to Tier II and Tier III systems. [Ref. 1]

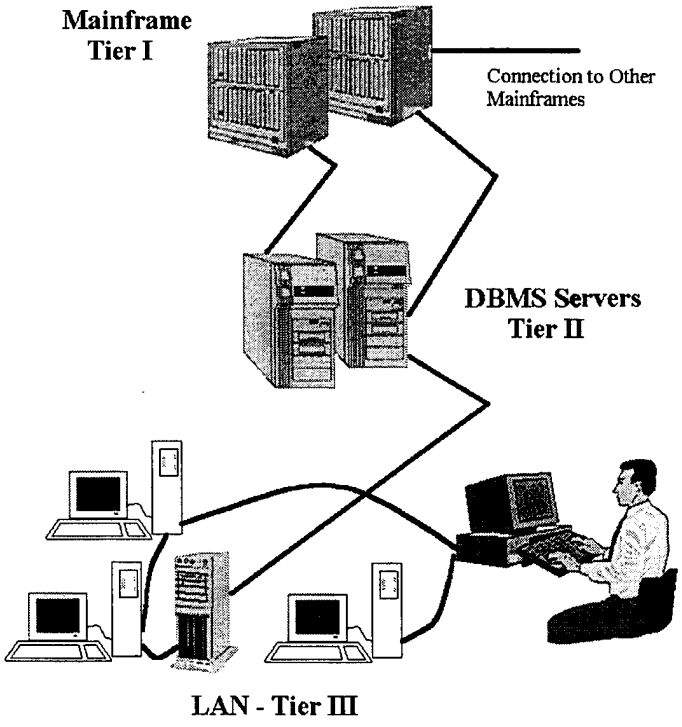

Figure 2. NAVSUP Tier Environment After Ref. [1]

FISC Norfolk was selected as a prototype site for the project and the source of data used to make recommendations in the report. It is apparent from the report, that FISC Norfolk Tier III was of limited capability. Although Chapter V of the BSS project draft report outlines a process to upgrade the Tier III capabilities of the Norfolk FISC, its content is generally aimed at hardware and software upgrades without consideration of the manpower and staffing requirements of such a system. [Ref. 1]

B. OBJECT OF THIS RESEARCH

The objective of this research is to produce an outline of the support requirements in both manpower and training required to maintain and operate Tier III level services for a typical FISC. To meet this objective, it will be necessary to identify each task likely required to support the normal business of the FISC. Hardware support for LAN and Wide Area Net (WAN) is easily identified function. This service will probably be contracted for from outside suppliers which is the case for most commercial businesses. Software support and engineering support are not clearly defined because some of the applications at this level will certainly be unique to the FISC. The manpower supporting these applications at Tier III should be proportional to the number of users of the system and the applications. By the users of the system is meant the actual person who operates either the PC or workstation which has access to the system. The customer of the system is not necessarily this person. The customer may only be requesting through the user or in a more efficient arrangement, the customer and the user may be the same. Efficiency is gained when a customer does not find it necessary to relay the customer's request through a user and the user does not find it necessary to interpret the results of that request for the customer. In an ideal system, the customer would query the data in a form the customer understands and receive the response in that same form. If a system is designed with the idea that a specialized user would perform translations for a customer, the system invariable will be designed for that user not the customer. As pointed out in Reference 1, one of the serious problems for the FISC is the slow response time for their customers.

The staffing of Tier I and Tier II operations will not be considered in this research. Tier I operations are the responsibility of DISA, not the FISC. The responsibility for Tier II operations is still unresolved. They may become the responsibility of the FISC or of DISA, or of some other organization yet to be identified. Since a decision has not been made on this issue, staffing of Tier II will also not be considered.

The problem of staffing at Tier III is interesting because Tier III staffing must, for maximum efficiency, be replicated at all FISC sites. This requires similar training, equipment, and software which should lead to consistent organization and manpower levels determined by the number of customers using the system.

Staffing of Tier III is also driven by requirements for standard operating procedures necessary to ensure an efficient operation. Without a standard for operation the FISC site and NAVSUP will again find themselves redesigning their computer systems to gain the advantages of some future technology or redesigning as a result of the demands of future mission changes. With a standard system NAVSUP will be able to transition to a future technology with the advantage of transitioning one system instead of maintaining an obsolete one while at the same time creating a new system.

The technological drive for these changes is the development of a Client-Server Model of computing system and the availability of very powerful computing equipment at the regional level Tier III. The Client-Server Model advantage is that software application is separated by a communication link from higher level application and data sources. Figure 3 shows Tier II and III of the BLC Congress proposed Client-Server System. The Database Management System (DBMS) Oracle version 7 is at Tier II. The communication link Tier II, Tier III as proposed will be provided by Open Database Conductivity (ODBC) and by Structured Query Language (SQL) interface standards [Ref. 1]. In time every element of an information system will become obsolete, but the structure of the system should represent the business logic of NAVSUP and the FISC. The structure of the system will represent the task performed at various levels of NAVSUP and the services required by the FISC. As any organization evolves and

acquires new missions, its information system should represent those missions and services at the appropriate level in the organization. Hardware and software changes can be made piecemeal and indeed the structure of the entire system can evolve to represent the evolving business logic of NAVSUP and the FISC sites.

C. LIMITATIONS OF THIS STUDY

Although, there is a great deal of information on the engineering development of software and information systems, the information on how to staff them once they are developed, is very limited. In fact, there is no research available at Naval Postgraduate School (NPGS) on this subject. Therefore, this study will have to conclude with identifying the tasks and skills required to maintain and operate a Tier III system. Another problem is that actually identifying the number of customers that each FISC can expect in this changing environment is a research project in itself.

D. ORGANIZATIONS OF THIS STUDY

The first chapter has given an overview of the BSS project and its objectives. Chapter II will show military and civilian staffing of LAN systems. Although these organizations are similar to the system envisioned for the FISC, each organization is unique and has evolved to meet its unique situation. Chapter III will identify each task required at Tier III. Chapter IV will correlate these tasks into positions and duties in each FISC organization. Chapter V will be conclusions and recommendations.

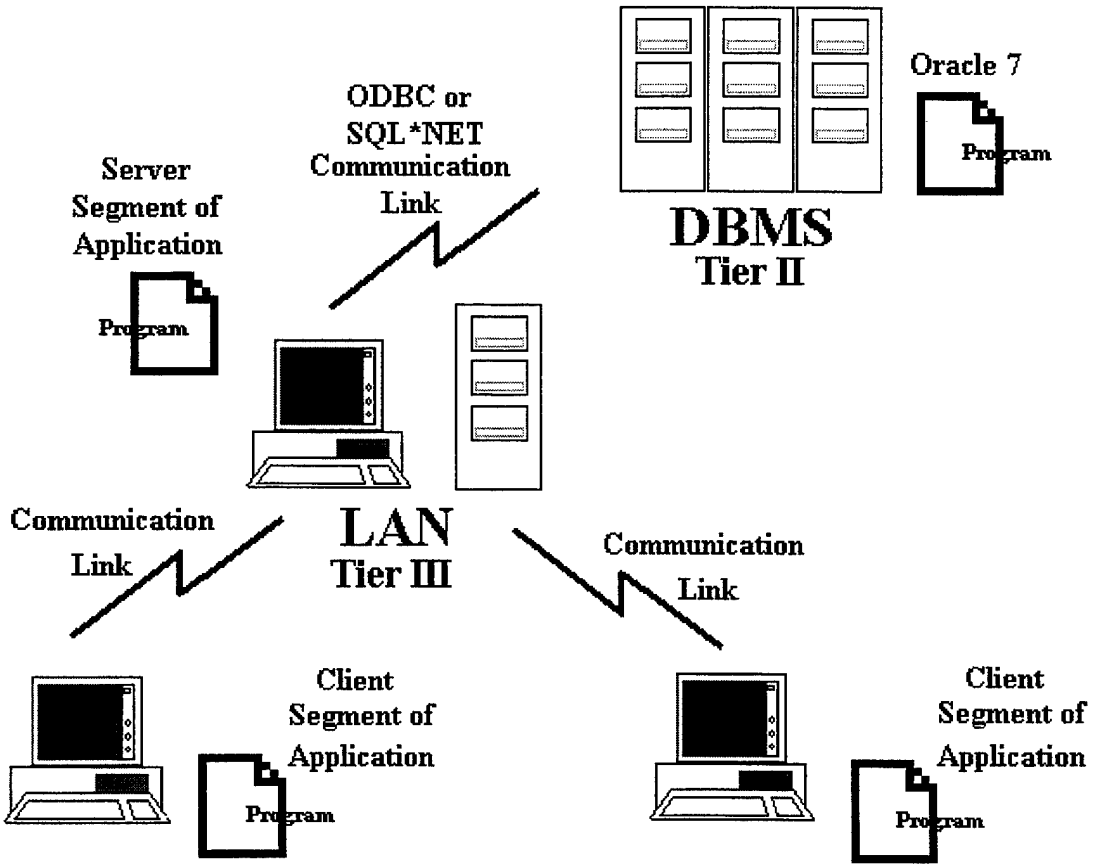

Figure 3. Client-Server Architecture

II. DESCRIPTION OF STAFFING AT EXAMPLE ORGANIZATIONS

This chapter will describe four LAN systems used by both government and private commercial operations. The information for two of the government systems was primarily gained through telephone conversations with personnel responsible for the management of those systems. The third government system the information is from personal experience having worked for several years in close proximity with the organization that maintained the LAN operation. In the case of the private system, information was obtained from the managers of the system when they gave me a day long tour, and generously enlightened me on the reasoning behind the design and management of their system.

A. NAVAL AVIATION SUPPLY CENTER (ASO)

ASO serves primarily as the inventory manager of Naval Aviation Material for all Navy and Marine aircraft. It controls the quantity of parts allowed for each piece of equipment that the Navy uses. This is determined based upon historical data at the squadron level and represents the squadron's allowed inventory of parts. This is an important function with a direct affect on the readiness of a squadron and the time that it takes to repair aircraft and the equipment used to support the aircraft.

1. LAN Hardware and Software

Early in 1990 ASO embarked on a technological transformation to a Client-Server architecture. Their strategy allowed data to be accessed from a large mainframe by a database server equivalent to the Tier II system envisioned by NAVSUP. This technology made use of a Graphical User Interface (GUI) and allowed the Tier III equivalent applications to access the corporate database transparently.

The Tier III LAN uses Novell 4.1 software with Windows base software at the end users computer. The servers for the LAN provides a single copy of the users software and the users Windows profile settings which is distributed over to the network to the

user at each workstation. The software is acquired with a multiple licensing agreement and controlled at the server. Network drivers and batch files used by the user are stored at the users workstation. The licensing of the software is a multiple distribution license because it achieves better economics than the purchasing of individual copies per user. The downside of having all the software source from the LAN server is that when the server experiences a hardware or software malfunction, the entire system is unusable. Additionally, if the number of users exceed the licensed quantities of the software, a user will have to wait until a copy becomes available.

The rationale database management system chosen was Oracle. Oracle software and its tightly integrated tool sets SQL Forms, SQL Plus, SQL Menu and SQL Report Writer are used by the end user to perform ad hoc queries, transactions or produce reports. The Tier I equivalent of the ASO system uses Fourth Generation Language (4GL) software (Focus). To use this software requires special training to produce efficient queries, but the users do have access to it and it is used when the transactions of the user require these greater capabilities.

ASO has created many stand-alone applications which are accessed through the Window system at the workstation. These applications perform recurring tasks required by the general user of the system.

2. Software Support

Support for applications developed by ASO is provided by a Subject Matter Expert (SME). This expert, as well as the designer of the software, is listed in the menu that is used to execute the software developed by ASO. The user is required to communicate with the SME. The SME is an analyst knowledgeable of the functions that this software was designed to perform.

All commercial applications and office automation software is managed by the Information Systems Planning Group (IS). The IS group develops or acquires new applications from direct feedback from the end users.

Support for end users is provided by the Information Systems Manager (ISM). The ISM is an individual who is knowledgeable about micro-computers and the common software in use. However, this is not the ISM's primary job. The ISM acts as a liaison between the end user and the "core" department information services team for that software. This is a team of personnel whose primary purpose is to support the information needs of their department. The ISM is able to filter 95% of the questions and problems with any particular application from the core team.

The core team is responsible for filtering requests from the ISM. Any questions or problems that the core team cannot resolve are forwarded to the IS help desk. Only core team members are allowed to request assistance from the IS help desk.

Software which is loaded on the end users computer is the responsibility of the end user. The IS group does not monitor or support stand-alone software, but the group allows end users to load their computers with any software they wish.

A small team of software experts is responsible for the Tier II system. The Tier II system is not directly supported by the IS group.

The system maintained at ASO is termed an "open system" with the end user controlling many of the aspects of the system. The end user is free to install any legal software and to tune his workstation to meet his requirements.

3. Architecture

ASO LAN is a Token Ring running Novell 4.1 software. It currently has eleven servers although ASO intends to combine those into three larger servers in the future. Connected to the LAN are approximately 2,000 workstations (500-386's, 150-Pentium, the remainder are 486's). The users software are Lotus SmartSuite (Lotus 1-2-3, AmiPro, Freelance Graphics), Rabbit 3279 Emulation, Visual Basic, cc:Mail, Paradox and Novell Perfect Office.

4. Staffing

Staffing for the ASO LAN operation is as follows:

- Supervisor for the Logistics Management Decision Support System (LMDSS).
- Three Branch Head Managers - provide supervision within their departments.
- Five Network Supervisors - responsible for managing the network, mapping, password control and printer management.
- Four Help Desk Personnel (IS Group) - process trouble calls passed to them from the Department Help Desk.
- Two LAN Design Team - responsible for LAN architecture and future planning.
- Four Software Personnel - assist with Commercial Off-The-Shelf Software (COTS) and government software.
- Two Developers - develop base level applications. For example: travel and small purchase software.
- Four Cablers - responsible for running cables, installing new hookups and the relocation of workstations.
- Two Personal Computer (PC) Repairmen - responsible for the minor maintenance, replacement of cards and upgrades of equipment and memory.
- Three UNIX Technicians - responsible for the UNIX computer systems.
- One Technician - for Electronic Data Interchange (EDI).
- One Technician - for Foreign Military Sales assigned to help with network connections and PC programs related to the network.
- One Military Liaison - provide a liaison between civilian and military when military operational questions arise.
- Thirteen Help Desk Personnel - these personnel are assigned to other departments to assist the end users. They actively participate in Automatic Data Processing (ADP) decisions to ensure that each department's interests are represented in the evaluation and acquisition process. These are the people

who all trouble calls are placed with initially. They solve 95% of these calls and refer the ones that cannot be solved to the core department information services team. The core team act as the network administrators for their department controlling passwords and user logons. Additionally, they are responsible for establishing a training curriculum and providing training to the end users.

B. AIRLANT, NORFOLK, VA

AIRLANT is a type command responsible for aircraft capable ships, aircraft squadrons, their configuration, budget and readiness on the Atlantic Coast.

1. LAN Hardware and Software

The AIRLANT LAN was developed as a secure and able to handle classified message traffic. Subsequently, the LAN was divided into two LANs which share the same secure conduits. The intent of the design was that all application software would remain on the servers and users would not be provided with storage space on the LANs system. However, technological changes and the division of the system into a classified and unclassified system and the larger storage requirements of the GUI Windows programs have resulted in end user data being stored on the end users PC.

The LAN uses Novell 3.12 software and the end users use a Windows environment. As in the case of the ASO system, the software is licensed from the LANs with the exception of the Comptroller's finance program, all software is COTS.

2. Software Support

Each department has established a departmental representative council to direct support and promulgate information to the department and division for the PC programs used within the system. Requests for help are forwarded by the departmental representatives to the IS department where they are researched for ultimate resolution. This is intended to filter the more simple problems from the IS staff. Backups are performed by Navy Radiomen but backups of end user data is the responsibility of the end user.

Most support is performed by contractor personnel. Support for minor repair and program installation is performed by contractor personnel. Major repairs are performed by other Navy facilities. Network support is performed by the network administrator who is a contractor. Training is provided for all software used on the system. The trainer is also responsible providing assistance on software problems for the end user.

The system is an open system in that each user's software is not identical. However, only approved software is allowed on the system. Some users require special software to receive spreadsheets, databases and word processing files from other commands. Each user is allowed to set his Windows environment as he wishes.

3. Architecture

The LAN architecture is an Ethernet with seven servers. Six for unclassified data and one dedicated to classified information. There are 500 plus (386 and Pentium) with four megs of memory. The intention of AIRLANT is the increase the memory to 16 megs. There is one Wang micro-computer used by the Comptroller. Gateways to the LAN connected to ASO.

Software used: WordPerfect, Harvard Graphics, Lotus SmartSuite, Message Text Format (MTF) Editor.

4. Staffing

Staffing of AIRLANT LAN is as follows:

- One Navy Captain - Chief Information Officer assisted by a Lieutenant and a Chief Warrant Officer.
- Project Manager - Supervises the contract personnel and provides support for the LAN.
- Two Certified LAN Administrators - responsible for cc:Mail, E-mail, Network, assigning passwords, new users and mapping disk drives. These are contractors.
- Task Leader - responsible for the supervision of the technical support personnel. Also provides the same services as the support personnel. This is a contractor.

- Three Technical Support Personnel - responsible for the trouble desk and providing help with Windows, DOS and hardware problems with the users PCs. Additionally, they are responsible for setting up new systems, running cables, minor repairs and installing new software. These are contractor personnel.

- One Clerk - responsible for maintaining the training schedule and answering the phone. This is also a contractor.

- One Data Processing Technician (DP) - is a LAN Administrator and provides some technical support. Enlisted USN E-6.

- Seven Radiomen (RM) - provides data processing support, nightly backups and are responsible for the powering up and down of the system, the routing of message traffic and reworking cc:Mail problems. Enlisted USN

- Trainer - responsible for all software training for word processors, databases, etc. Provides software support. This position is a contractor.

- Database Manager - provide database programming for the Comptroller. This is a contractor position.

- MFT Editor Trainer - provides training for the MFT editor. This is also a contractor position.

C. FISC SAN DIEGO, CA

The FISC is responsible for managing consumable supplies, inventory reduction and offers its supply management expertise in partnership for other organizations. Some of these partnerships are as far away as Ingleside, Texas.

1. LAN Hardware and Software

The LAN at FISC San Diego appears to be in the process of creation. Currently it has been used mostly for Email and office automation purposes. The LAN provides minimum support for common office automation tools and as a result, the LAN team supports multiple versions of the same software packages. For example, the team supports WordPerfect version 5.1 to a version 6.0. Although the team receives quarterly updates to software packages, it is unrealistic for them to update the 900 plus workstations they support for each new release. The FISC plans to implement a common

help desk to support software packages but currently the various portions of the LANs system do not share information on software installed or support a common software suite. Currently, the LANs uses Novell 3.12 software and the FISC intends to move to Novell 4.1 and a Windows environment. The cc:Mail software is on a single server and as use of the mail packages increase, administrating this software package may become a problem with more than 900 users. [Ref. 1]

2. Software Support

Currently, the LANs support team is focused on keeping the LANs functional and connecting to new partnerships for the FISC. The LAN support team tracks all requests for assistance and directly assists the user in resolving problems. The LANs support team faces a backlog of numerous projects and lacks the capability of supporting remote servers because they lack the tools to monitor them. Currently, there are no mechanisms for nightly backing up the servers or stand-by power supplies for maintaining the servers. The LAN only operates during normal business hours in Pacific Standard Time which will be a problem as FISC San Diego gains more partnerships in other time zones. [Ref. 1]

3. Architecture

The LAN is configured as a token ring with some Earthnet configuration. The local site has six servers which the FISC intends to consolidate into one super server. Remote sites have a server to share applications at those sites and connect the WAN used by the FISC. There are approximately 900 users connected to the system (50-286, the remainder 386 and Pentium). [Ref. 1]

4. Staffing

Staffing of San Diego FISC LAN is as follows:

- One CIO - Chief Information Officer.
- Two Supervisors - provide supervision for nine personnel that operate the LAN.

- Nine network support personnel - provide support for the servers, cable runs and the installation of new equipment and software. Provide some assistance with the administration of the LAN.

- Two programmers - develop programs for the end users of the LAN.

- Four administrative personnel - provide business functions and support to the staff including Life Cycle Management (LCM), budgeting, and equipment inventory.

- Four network administrators - contractor personnel who provide administration of the LAN and training for network support personnel and supervisors.

- Two Trainers - provide training in COTS software and locally developed software available to end users on the LAN.

- Two help desk personnel - assist the end user with trouble calls, identify the problem, resolve problems or direct the problem to personnel able to resolve the problem.

D. MAJOR NATIONAL CREDIT COMPANY

This LAN is maintained by civilian commercial operation that services credit card accounts for a major manufacturer.

1. LAN Hardware and Software

This company's information system consist of Tier I, II and III equivalent computer systems with LANs and WANs supporting in excess of 4,000 PCs. The current operating system is Novell 3.12. The company intends to move to Novell 4.1 in the near future. The end user environment is Windows. All programs are located on the LANs servers and commercially supplied software is multi-licensed. All software and configuration files are identical throughout the system. All software that is used in the system is determined at the level of the LAN management. No other software is permitted or installed. The system itself monitors the workstations to insure that the configuration remains identical. All of the 4,000 PCs are Compaq Computers with 8 megs of RAM. Each computer is equipped with identical cards and video displays.

2. Software Support

The initial support method is that any user experiencing problems can move to another identical station and continue working. Since the system is constructed of identical components both hardware and software, the problems experienced are recurring and have usually been experienced by the LANs staff previously. If the problem is a hardware problem, the computer staff will confirm that a part has failed and purchase a replacement from a vendor near the site of the failure. Additionally, they will have the vendor install the part. All new software installed on the system is thoroughly evaluated by the LANs staff before installation. New employees are expected to be able to use standard COTS software such as word processors, spreadsheets, etc. when they are hired.

This system is a "closed" system. The end user is not allowed to change the smallest aspect of the system. For example, the background color of a window on the user's screen. The company's theory of management is essentially time spent playing with the system is time lost for productive work. Even the most minor change will inadvertently lead to more support costs and larger problems for the LAN staff to solve.

3. Architecture

The LANs runs Novell 3.1 software and provides a Windows environment for the users. There are 60 servers and 4,000 plus PCs connected to the network. They are all 486 computers. Most of the LAN is an Ethernet LAN with some token ring configurations. Each PC is provided with Microsoft Office and proprietary software developed by the LANs staff. There is a 3270 emulator which allows four sessions on one PC screen.

4. Staffing

Staffing for the LAN is sparse considering that the LAN staff is also involved in developing programs for the end users. Staffing is as follows:

- One Manager - overall supervisor.
- Four Network Managers - responsible for a Network Engineer's duties although they are not certified engineers.

- Four Architects - responsible for design and follow on construction of the LAN and responsible for research on improvements in performance and minimizing costs.

- Five Hardware Support Personnel - one of these personnel serves as a manager, and with the other personnel manage all trouble calls.

- Three Installation Personnel - provide architectural support, installing new equipment and minor cabling changes.

- Five Help Desk Personnel - responsible for taking trouble calls from the end user and managing minor trouble calls and forwarding more difficult problems to the hardware support personnel for resolution.

- Fifteen Program Developers - responsible for the development of proprietary programs used by the company. Development is in C++, Visual Basic, COBOL languages.

- Six Trainers - responsible for training on all proprietary software. COTS software training that is required is outsourced. For the most part, new employees are expected to be competent with COTS software.

III. BSS AND SUPPORT ORGANIZATION FUNCTIONS

This chapter will outline the functions that must be performed by the staff of the FISC LAN operation. These functions are divided into 12 groups of tasks. These groupings are based on functional tasks and do not necessarily represent an organizational picture of the LAN operation. The 12 groups are as follows:

- Management - consists of the overall administrator for the operation, the budget and planning personnel required to support any organization, and the key supervisors of the organization who are responsible for communicating with the personnel assigned to the operation.

- Operations - these are tasks required for a safe and useful LAN operation. Examples of this would be maintaining backups and maintaining libraries of software for the users.

- Database Administration - establish and maintain databases and the access to them.

- Commercial Application Management - establish standard COTS software configurations. For example, promote common configurations for use throughout the LAN and plan and supervise the migration from one software package to another.

- Help Desk - receives, processes and tracks trouble calls for the end user. Acts as the interface between LANs customers and the LANs support and maintenance personnel.

- Systems Administration - these are the tasks that relate to the operation of the LAN. For example, tuning system performance, scheduling backups, installing software, etc.

- Configuration Management - this is an administrative task related to recording the configuration of all the equipment connected to the LAN and maintaining the spare parts, supplies required for repair.

- Security - these are tasks related to access and control of the LAN, passwords and the physical security of the LAN, locked doors, etc.

- Engineering Support - this is the hardware support for the LAN. For example, maintenance of equipment.
- Systems Support - this is the software support for the LAN. For example, installing new software specific to the LAN.
- Project Management - tasks include the planning and development of configuration changes and new software for the LAN.
- Training - tasks include developing training plans for the software that is used on the LAN.

A. MANAGEMENT

The upper level management of the LAN operation is responsible for developing the business plan of the operation and determining the evolutionary direction of the BSS department. This should be done with the typical tools of any organization's management, mission statements, and organizational structure charts. Managers at this level do not necessarily require an in depth technical training in computer systems and LANs. Their main task is communication and strategic decisionmaking for the organization's overall operation.

1. Guidance and Policy

This is the task of interpretation of law, higher directives and technical standards to establish operating procedures and policies.

2. Budget and Life Cycle Management (LCM)

In addition to the normal budgeting operations of personnel, maintenance costs, and the cost of expendable materials, unique to a technological operation of the LAN, it is necessary for management to anticipate the costs of upgrading equipment, modification necessary to repair existing software and hardware and maintaining the LAN. The equipment must be supported by the manufacturer. When equipment is obsolete or no longer supported by the manufacturer, it becomes prohibitively expensive to maintain.

3. Establish Objectives

Without clear objectives and future planning the organization will not follow a common path or commitment to goals.

4. Marketing Functions

The FISC have recently moved from an entity that requires their customers to follow procedures developed by the FISC and NAVSUP to an entity which performs services for a customer where the FISC must be able to respond to the customers needs. This change requires that the FISC act as a salesman for their services and generally follow the normal business practice of acquiring business from customers.

B. OPERATIONS

These tasks are important to the day-to-day operation of the LAN. Without a consistent operational procedure, the LAN will appear to both the users and the support personnel to be inconsistent and the customers will not design the services provided by the LAN into their own operations.

Operations also insures that backups are performed on a scheduled basis. This is a form of insurance for the LAN operation against natural disaster or mis-operation of the LAN system. Although the hardware in modern computer systems is very reliable, any information, database or software being used and software being developed is at risk of being lost through a hardware failure. Additionally, in my experience, the most common reason for losing software is through an inadvertent action on the part of a user with the authority to delete that software. My experience with large real-time systems, is that users invariably call the next day asking for support personnel to replace files which they have accidentally deleted.

Backups also serve as an historical record of the changes to the system over time. This is often useful when it is discovered that a database has been corrupted by a new piece of software. With the proper backup operation, it would be possible for the database

administrator to recover both the original data and all uncorrupted updates to the database.

The backups also serve as the chief means of moving software to new systems as hardware is replaced and upgraded. Although it is possible to completely rebuild a system with COTS software, the system will be completely devoid of the end users data.

1. Monitor Compliance with Regulations and Instructions

For consistent operation, end users and support personnel must use the system in accordance with the security and regulations established by management. If individual users operate outside of established procedures, losses of data, software and the security for individual users can occur. Operations outside of security procedures sometimes compromise the backup system and leave the system in a condition where it cannot be rebuilt.

2 Perform Testing

Operation performance testing is accomplished periodically to insure that the system is operating efficiently and to discover hardware and software problems which users of the system may not be able to detect.

3 Monitor System Resources

Since the system resources are shared, it is necessary to monitor the use of those resources by individual users. For example, if users are running out of storage space on the system, it may be because their requirements have increased or more likely because they have failed to periodically remove unused files from the system. Monitoring these resources will make them available to other users and indicate to the support personnel when the system should be enlarged.

4 Power Up and Power Down the System

Complex systems can be made less complex by using consistent procedures when operating them. This task also includes powering up after electrical power failures and recovery operations which may be necessary to prevent the loss of data.

C. DATABASE ADMINISTRATION

The tasks associated with database administration are driven by the needs of the users of the LAN. These tasks include both local and remote database requirements of the system end user.

1. Backups

Tasks associated with backups include determining which portions of the system associated with database management should be backed up and which portions can be recreated or regenerated. Additionally, this task includes development of a recovery plan for the local database operations.

2. Standards and Procedures

In order to maintain the integrity of the database operations, it is necessary to develop and monitor the standard operating procedures for the database.

3. Maintenance

Databases represent many man-hours of work by the users and have high economic value for the organization. To maintain their integrity and usefulness, constant and careful maintenance is required. Maintenance will also minimize resources needed from the LAN to support the database operations of the user.

4. Security

Database management includes ensuring that users have authorized access to the system and that the security and integrity of the database is maintained.

5. Performance Testing

Customer satisfaction and utilization of most database software is directly related to the time required to perform queries of the system. A system which performs poorly will not be used and will consume resources of the LAN unnecessarily. Information to make decisions or information that the user needs, will be obtained from a more usable source.

6. Program Development

Efficient use of the system will require the development of programs tailored to the users of the database. This also includes software on the LAN which will perform queries of remote databases used by many end users.

Database operations are driven by the users of the system. The users will be the first to discover new requirements and needs. As a consequence, to support the users the LAN personnel will need to quickly develop software to meet these needs.

D. COMMERCIAL APPLICATION MANAGEMENT

COTS software used on the LAN accounts for the largest percentage of space and utilization. Figure 4 shows the demographics of COTS software as a percent of user time spent on software types. The government, like other employers is required to license or purchase software used by its employees. The government is also required to ensure that employees are not using unauthorized software.

1. Configuration Management

COTS software is periodically updated with fixes for defects and improvements in operation. To create a consistent environment for the users of the system, it is necessary to update the COTS software as widely and timely as possible on the LAN. Modern GUI software is made up of many components. To function correctly, these components must be consistent with each other. For example, word processors use the fonts supplied by the manufacturer of the software, a document produced on one workstation with one set of fonts may look entirely different on another workstation with an older set of fonts. A user confronted with this problem will simply print the document and mail it to the destination. Thereby, completely nullifying one of the advantages of the LAN which is to reduce the paper used in the office. Configuration management requires extensive recordkeeping and personnel who have a wide and detailed knowledge of the COTS software used by the customers.

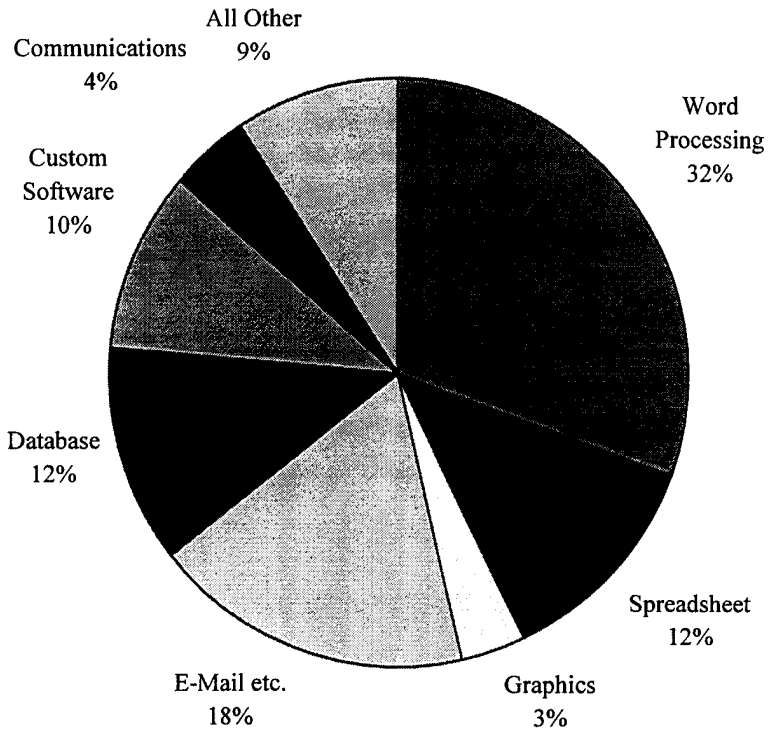

Figure 4. Percent of End-user Time Spent on Different PC-based Applications. After Ref. [2]

2. Testing and Evaluation

Like database management, the software made available to the user is driven by the users requirements. It is necessary to determine whether the software that a user would like to use is compatible with the system. Additionally, the technical personnel on the LAN will be requested by the users to recommend software to solve particular user problems.

3. Archives

Configuration management requires that the LAN organization maintain archives of the software used on the system in order to recreate the system or move the systems configuration back to a more reliable version of the COTS software.

4. Maintain Software

COTS and developed software are periodically revised and require updating. When the software is updated it is necessary to recover the users configuration and move that configuration to the new version. Additionally, COTS software sometimes will stop functioning because of conflicts with other software that is newly installed. This requires that the conflict be resolved and the software be reinstalled.

E. HELP DESK

The users interface to the LAN organization is the help desk. The help desk also acts as an advocate for the users needs and pursues solutions to the users problems. However, it is important for management to ensure that the help desk is not used to insulate the LANs support personnel from the problems or needs of the end user. The LANs overall task is the support of customers.

1. Receive and Process Trouble Calls

This task includes recording and tracking of user problems. Some minor problems because they are repetitive, will be solved immediately by the help desk personnel. Other problems which may require more knowledgeable personnel, must be resolved by other LAN support personnel. It would be the task of the help desk personnel to direct the trouble calls to the most likely person to solve the problem.

2. Analyze Trouble Calls

The help desk is an interface with the user who is dissatisfied with the system. This user either directly or indirectly will be able to supply the information needed to improve the LAN and to reconfigure so that it is more useful. A careful analysis of the trouble calls that result in helping the user to use a particular piece of software will generate a list of training needs. These are the kinds of problems normally resolved by the help desk personnel immediately but usually are not well documented.

3. Generate Reports

In order for the help desk to work, it is necessary that higher level management aggressively pursue the resolution of customer problems. In order for management to do this, they must be informed of the status of trouble calls and whether or not support personnel are actively engaged in their resolution. Without this mechanism, the help desk may disintegrate into simply a barrier between the customer and the maintenance support personnel.

F. SYSTEM ADMINISTRATION

System administration is the task of configuring the LAN software systems.

1. Performance Monitoring

To maximize the resources available to the end user of the LAN, it is necessary to monitor the usage of the system and tune the system to maximum performance. A part of this is keeping historical records of the changes made and the results achieved with different configurations.

2. Backup

The backup task for the system administrator is to determine which parts of the system configuration should be backed up. An additional task is to schedule the frequency of backups throughout the system. This must be based on an analysis on how the system is being used.

3. Account Maintenance

Account maintenance is adding and deleting users to the system and determining the users authorization for the use of the resources of the LAN.

4. Managing Network Resources

This task is monitoring the use of network printers, network FAX and other special peripheral equipment provided to the users. For example, special plotters.

5. Install, Configure and Monitor COTS Software

The system administration tasks include installing COTS software that is to be made available from the LAN to the users of the system. This task includes monitoring compliance with the licensing of the COTS software.

6. Maintenance

An additional task is to resolve systems software problems. These are problems that are related to the LAN, LANs software and connections to other networks and systems.

G. CONFIGURATION MANAGEMENT

Configuration management is the recordkeeping process of recording changes to both the hardware and software configurations of the LAN. Software includes both computer software and the publications required to operate and maintain the LAN.

1. Inventory

Inventory management requires periodic surveys of the equipment used to maintain and operate the LAN, and the equipment that is part of the LAN. This includes identifying each significant piece of property uniquely, both hardware and software, keeping records of its revision level.

2. Publications

Publications are updated in the same time frame as computer software and equipment. The resolution of trouble calls and the maintenance of the LANs system requires that the publications track the revision levels of the hardware and software. The best way to accomplish this tracking is to establish a library of publications for the use of the support personnel in much the same way as people would use a public library. For example, checking publications in and out and storing them in some retrievable manner.

3. Parts Support

For timely maintenance to be performed it is necessary to maintain a small parts inventory at the LAN site. The recordkeeping operations associated with this should, over time, create an inventory which serves the needs of support and maintenance personnel.

H. SECURITY

Security includes the physical access to the equipment and the communication access to software and data stored on the LAN.

1. Access Control

This task includes password generating for the users and ensuring the users have authority to access software packages and databases. This task also includes the monitoring of the use of the system to ensure that the procedures and regulations are being followed. In modern computer systems, passwords are generated for the user rather than the user developing them. The reasoning behind this, is that the user tends to generate passwords which are easily compromised.

2. Physical Security

This includes not only the aspect of locked doors and files, but the storage off-site of backup material so that the system can be rebuilt even after major disaster of fire or earthquake. These tasks may include generating the backups or monitoring the recordkeeping system to ensure that the backups schedule is being maintained. Both software and hardware security should be in place to prevent even the support personnel who manage the LAN from inadvertently destroying the backup archives or damaging the equipment. In my experience, the most likely person to inadvertently destroy backup archives is personnel who believe at the time that they are performing a required or necessary operation. The use of backup archives should be a management decision because it places the entire operation at risk.

I. ENGINEERING SUPPORT

Engineering support is directed at the hardware portion of the LAN and includes maintenance and preventative maintenance of the equipment used on the LAN and equipment to maintain the LAN.

1. Maintenance

These tasks include the repair of hardware problems on the LAN and the research needed to ensure that there is, in fact a software problem. The complexity of this equipment tends to generate problems which masquerade as hardware but are in fact inappropriate configurations of software or the LAN system. With modern equipment it is very rare to actually encounter a hardware problem. The failure rate for semi-conductors is very low. Hardware problems that do occur are related to mechanical systems. For example, keyboards, disk drives.

2. Install Hardware

In order to maintain configuration control it is necessary to have the task of installing hardware performed by the support personnel not by the users. This task includes the testing of the hardware in the system.

3. Preventative Maintenance

Preventative maintenance is performed to prevent the failure of equipment. It includes changing the air filters, cleaning keyboards and equipment and running computer diagnostics to test components of the LAN. Preventative maintenance includes the calibration of test equipment used to maintain the LAN.

4. Monitor Warranty and Vendor Maintenance

This task is to ensure repairs made to the equipment under warranty or by an outside source are in fact complete and that the returned equipment has not been degraded during the repair.

5. Testing

This task includes testing new equipment and new software to be used on a LAN. Additionally, testing of upgrades to see that they do not lead to unforeseen problems

before they are installed widely on the LAN. Testing should also be performed on all equipment that has been repaired locally.

J. SYSTEMS SUPPORT

Systems support tasks include the resolution of problems that have to do with the software used on the LAN or the equipment specific to the LAN.

1. Installation

This task includes installing all equipment and software used in the LAN operation.

2. Support

This task includes resolving problems with the network both its logical mapping and its physical electrical mapping. This task includes the testing and monitoring of the physical connections of the LAN.

K. PROJECT MANAGEMENT

Project management tasks consists of tasks created when systems are updated, modified or new customers are brought into the partnerships or existing customers require new services.

1. Project Planning

To reduce the effects of changes on the users, it is necessary to carefully plan any changes to the system. Without such planning users and support personnel would be unaware of changes and unable to solve or account for problems with the system.

2. Develop Problem Descriptions

The results of this task are detailed descriptions of system problems to assist the support personnel in determining a solution for any particular problem and the project planning that should follow.

3. Analysis

This task is to perform analysis of the problems and processes and the technology used in the LAN to determine how improvements can be implemented in the operation or whether new technologies are appropriate for the customers.

4. Obtain Funding

This task is a budgeting task required to install new equipment and personnel positions in the operation of the LAN.

5. Prototype Applications

To improve response to the customer needs, it is necessary to locally develop prototypes that meet those needs. Even in the case where the final program will be developed off site, the initial prototype can be used to refine the users request and produce a structure for a program which will, when complete, be useful.

L. TRAINING

Training includes not only the giving the training but the planning of training for both the users of the system and the support personnel.

1. Training Plans COTS Software and Hardware

Training is one of the most important factors on reducing the day-to-day crisis management that technical operations experience. Poorly trained personnel not only are slow to solve the problems on the LAN, but are likely to introduce problems into the system while attempting to solve the current problem. This is analogous to the maintenance of software programs, where a programming attempts to fix a bug and thereby introduces other bugs.

A training plan will allow management to target the weak areas of expertise among the support personnel, and in the long run, will reduce the number of problems that the LAN operation will experience. Without a training plan, the nature of crisis management will push training requirements to a low priority, since they will not be seen as contributing to the solution for LAN problems.

2. Training Courses In-House Software

Software in the system which is unique to the LAN require that courses be developed locally. This task includes the development of training materials and publications for those systems. These courses are developed for both support personnel and end users of the system. The courses and materials developed are very important to the LAN organization in maintaining continuity over time when employees who are experts in some systems leave the organization.

3. Provide Reimbursable Training

The LAN organization, because of its relationship with the users, can provide the training for both COTS software and its in-house software to the end users.

4. Training Economics

Training costs should be balanced against the cost of providing support to the end users. If the end users are well trained and competent, support costs for the LAN will decrease. It is very much in the interest of the FISC to provide reimbursable training to their customers even on a break even basis because this training will ultimately reduce the personnel costs of the FISC for providing support to the end users.

M. SUMMARY

This chapter has presented the essential tasks that would be necessary for an information service operation at the FISC. It has presented all the tasks which are unique to the LAN operation and an electronics maintenance operation.

IV. STAFFING OF THE BSS LAN

There are two strategic questions to answer when staffing the FISC LAN operation. The first is whether the management of the operation will be subordinate to an existing FISC department, or whether it will be a new department under the Commanding Officer of the FISC. At some FISC several departments operate their own LANs, and if a new department is established under a Chief Information Officer (CIO), these assets will have to be transferred to that department. This is, in fact, what the BSS project team recommends [Ref. 1]. This has the advantage of centralizing the control of these computer assets and making it easier to establish standards and obtain budget authority [Ref. 1].

The second strategic question to answer is whether the LAN will be an open system or a closed system. In the examples in Chapter II, all of the government systems were open systems. The civilian credit company was an example of a closed system where the user was not allowed to modify even the background color of his Windows screen.

A. CHIEF INFORMATION OFFICER (CIO)

A CIO Department under the Commanding Officer of the FISC is one of the most important proposals made by the BSS team. This position of CIO would have greater authority to establish standards within the FISC. Additionally, the CIO would have greater influence in budget questions with the FISC. It would be easier to centralize the FISC resources devoted to the LAN under a department than under a division. The BSS team recommends that if it is not possible to create another department than an existing department should be designated as the CIO. An additional advantage of this arrangement, is that under the proposed missions for the FISC, the FISC supplies services to their customers. This requires that the CIO act as a chief salesman for information services supplied by the FISC. If the CIO were subordinate to a department head,

authority would have to be gained by that department head to obligate the department to supply services to an outside organization. That department head would probably be engaged in selling the unique services of that department to outside organizations. Information services would not receive the emphasis that would allow them to transition to the new business oriented operation of the FISC. Essentially if the information services is not established as an entity under the Commanding Officer, they cannot hope to survive the transition to the new environment. Customers will simply find the services easier to obtain from NAVSUP and again, individual non-standardized connections will be made for the information. NAVSUP will have missed the opportunity to reduce cost and standardize the system.

B. CHARACTERISTICS OF OPEN AND CLOSED SYSTEMS

1. Open Systems

In an open system as defined for the purposes of staffing, the end user is permitted to change any aspect of his personal workstation. The end user is allowed to install any software the end user wishes and finds useful. In relationship to the LAN, the end user is permitted to designate the printers that will be used and other system resources which in an open system are made available to all users.

An open system in relationship to a database operation allows all end user to perform queries directly to the database. The user may be allowed unrestricted authority to update or modify the database.

An open system as related to hardware would allow end users to configure their workstation without regard to the standards developed by the LAN support personnel. It would then be the task of the LAN support personnel to reconfigure the LAN to support the end users workstation.

2. Closed Systems

In a closed system, software is configured by the support personnel of the LAN. Software on each workstation is packaged for the tasks of the user at that workstation.

The user is not permitted to modify the configuration of that software or load on his workstation software that is unauthorized. In a very closed system, the user is not allowed to modify his workstation's environment as in the case in Chapter II for the credit card company.

In a closed system in relationship to database operations, the user has a restricted access to the database. Queries are pre-programmed for the end user and these are the only method that the end user can access the database. The end user is also restricted in the type of updates he is allowed to make to the database.

In a closed system in relationship to hardware, the configuration of all hardware is the responsibility of the support personnel on the LAN, and for efficiency is normally identical at each workstation. In this system, the hardware is selected to be compatible with the LAN, not with the requirements of any particular end user.

3. Advantage and Disadvantage of Open and Close Systems

Table 1 shows the characteristics, advantage and disadvantage of open and closed systems. Staffing of the LAN is dependent on whether the LAN system will be a closed or open system. An open system requires a more knowledgeable user and supporter than the closed system. This should lead to a higher operating cost for an open system.

Although a closed system as demonstrated by the credit card company, requires less support, the requirements of the FISC in some cases, dictate an open system. Probably, the most economically efficient configuration would be a closed system for the majority of the end users of the LAN. Support personnel should allow more open access to end users who require more sophisticated capabilities.

4. Summary

The reality of the current budgeting of the Armed Forces dictate that each operation be economically efficient. Closed systems should be the most economical systems to operate. Economics must be balanced against the current configuration of the FISC and the partnerships that the FISC have formed. These realities include hardware and software which varies widely between operations and additionally, there is no

common standard between the LANs and the workstations. Compounding this problem, is that the FISC does not actually have physical control of the networks of the partnerships they have formed.

	Open Systems	Closed System
Characteristics		
Software	Controlled by User	Controlled by Support Personnel
Database	Unrestricted Access	Restricted Access
Hardware	Controlled by User	LAN and User Hardware are Compatible
Training Requirements	Users Require Extensive Training	Users Require Minimum Training
Support	Users Require Extensive Support from LAN Personnel	Users Require Minimal Support
Advantages	User May Use Any Software They Require Without Approval	LAN personnel are required only to support authorized software
	User May Query Databases Without Restriction	Databases are protected against unauthorized use
	User May Install Any Hardware	Any Single Workstation can Replace a Malfunctioning Workstation
		Extensive Training is not Required for the User
		Continuity will be Maintained when Users Leave
Disadvantages	User Requires Extensive Training	Users will not be as Adaptable as in the Open System
	More Trouble Calls Related to Incompatible Software and Hardware	
	Delays While LAN Personnel Connect to the User's Hardware and Software	Hardware and Software may not meet the Users Needs
	LAN Personnel May Not be Able to Assist the User With the Unique Hardware and Software of the User	Initial Cost to Create Identical Configurations of Hardware and Software
	Continuity Will be Lost when the User Leaves	

Table 1. Open and Closed System

To achieve a more economical system, the FISC should move towards a closed system whenever possible. Since the FISCs are at the top of the system made up of their partnerships it would be possible for the FISC to promulgate standards of hardware and software configuration downwards. Initially, the cost for the FISC will reflect the cost of

operating an open system. As time passes and the inevitable technological changes will replace hardware and software, the entire system should migrate towards a closed system reducing costs of training and incompatibilities between hardware and software.

Another factor affecting migration of the system to a closed system is that the partnerships formed by the FISC are actually the FISCs customers. In order to keep the customers, the FISC must supply services that they require. If those services require an open system, the FISC should minimize the costs associated with an open system by providing the training to the personnel of the partnership. The way this minimizes the cost is that the training materials are common to all partnerships and that continuity is maintained by the FISC.

An additional method of reducing the openness of the system, is for the FISC to develop the software used by the end users and partnerships to access the system. Since this software is developed for the partnership, it will meet their needs and since it is developed by the FISC it will meet whatever standards the FISC has established.

For the purpose of this chapter, the staffing will be based on an open system with the intention of evolving that system to a closed system over time. To evolve the current systems to a closed system the LAN operation will require more support and training personnel. This can be accomplished by contracting the initial training operation and the additional personnel required initially for support of the LAN. These contracted operations should be for personnel not supervision. The direction of evolution of the LAN should be towards a closed system. A completely contracted operation would not have the incentives of reducing cost to the government.

C. CIO ORGANIZATION

The CIO Department Level management of the LAN operation is responsible for direction and coordination of the six divisions as proposed by BSS project. BSS project proposed staffing for the CIO organization divides the organization into following six divisions:

- Systems Support Services
- Network Support Services
- Application Development Services
- Operational Services
- Infrastructure Support Services
- Training

Task Groups	Task
Management	Guidance and Policy
	Budget and Life Cycle Management (LCM)
	Establish Objectives
	Marketing Functions
Operations	Monitor Compliance with Regulations and Instructions
Help Desk	Analyze Trouble Calls
Project Management	Project Planning
	Develop Problem Descriptions
	Analysis
	Obtain Funding
Training	Training Plans COTS Software and Hardware
	Training Courses In-House Software

Table 2. CIO Department Tasks

1. Systems Support Services

This division is responsible for providing a liaison between the FISC and the Tier I and Tier II servers. This division should plan the connections with the database support at Tier II. This support has yet to be determined so initially this division will only be involved in planning. If the Tier II operation is created as a database operation using SQL

then this division will be able to produce the software needed to access the Tier II databases before a final design of the Tier II system is completed. This points out one of the advantages of a client-server system and that systems can be constructed simultaneously even though the design of either system has not reached its final form. [Ref. 1]

Task Groups	Task
Project Management	Project Planning
Database Administration	Program Development
	Standards and Procedures

Table 3. Systems Support Services Tasks

2. Network Support Services

This division would be responsible for the administration of the LAN. This includes tuning the network performance, mapping the network disk drives, resolving network conflicts and assigning end users accounts and passwords. This division would be responsible trouble calls which involve network resources and services. [Ref. 1]

Task Groups	Task
System Administration	Performance Monitoring
	Backup
	Account Maintenance
	Managing Network Resources
	Install, Configure and Monitor COTS Software
	Maintenance
Security	Access Control
System Support	Support
Project Management	Project Planning
Database Management	Backup
	Maintenance
	Security

Table 4. Network Support Services Tasks

3. Application Development Services

This division will be responsible for developing local software to meet customer database needs. It will be primarily directed at efficiency improvements for the user. For example, pre-programming queries which are repetitively made by the user. An additional assignment for this division is to work the trouble calls having to do with database access and database software.

Task Groups	Task
Database Administration	Program Development
	Performance Testing
Commercial Application Management	Configuration Management
	Testing and Evaluation
	Archives
	Maintain Software
Project Management	Project Planning
	Develop Prototype

Table 5. Application Development Services Tasks

4. Operational Services

This division is responsible for liaison with the end user. This is the entry point for all trouble calls and the division is responsible for directing those trouble calls to the division which is determined to be most likely to resolve them. Additionally, this division will be responsible for the physical security of the CIO Department. This division is responsible for configuration management. This division is the CIO link to the user and as such, this division is required to produce the reports necessary to enable the CIO to make decisions related to the customers of LAN. [Ref. 1]

Task Groups	Task
Operations	Monitor Compliance with Regulations and Instructions
	Perform Testing
	Monitor System Resources
	Power Up and Down the System
Help Desk	Receive and Process Trouble Calls
	Analyze
	Trouble Calls
	Generate Reports
Database Administration	Standards and Procedures
Security	Physical Security
Configuration Management	Publications
Project Management	Project Planning

Table 6. Operational Services Tasks

5. Infrastructure Support Services

This division is responsible for the physical LAN including repair, maintenance, upgrading and inventorying the assets of the CIO Department. [Ref. 1]

Task Groups	Task
Configuration Management	Inventory
	Parts Support
Engineering Support	Maintenance
	Install Hardware
	Preventative Maintenance
	Monitor Warranty and Vendor Maintenance
	Testing
System Support	Installation
Project Management	Project Planning

Table 7. Infrastructure Support Services Tasks

6. Training

This division performs all training and the development of training plans. The division is responsible for monitoring training received from outside sources and budgeting the training required for BLC. [Ref. 1]

Task Groups	Task
Help Desk	Analyze Trouble Calls
Project Management	Project Planning
Training	Training Plans COTS Software and Hardware
	Training Courses In-House Software
	Provide Reimbursable Training

Table 8. Training Tasks

D. STAFFING

This proposal suggests numbers of personnel based on the four LANs surveyed in Chapter II. The government LANs are open systems which can be expected to require higher numbers of support personnel. The ASO LAN supports users well-versed in computer technology and responsible for the analysis of supply support. At the other extreme, is the civilian credit operation which supports a user that is well-trained in the task that they perform. These users are at the opposite end of the spectrum from an open system at ASO to the closed system at the credit agency. In the center of these extremes are the FISCs at Norfolk and San Diego. The proposed staffing is for an open system which should, in time, evolve to a more closed system requiring less support than ASO, but the system will still require more support than the users of the credit agency.

The support required for the end user, is very much a function of how well the end user is trained, especially in support provided for an open system. Shown in Figure 5 is a chart which depicts the support per user as a function of the staffing of the surveyed LANS and the proposed LAN operation. This chart assumes a linear relationship

between the number of support personnel and the number of end users. This is obviously not a good model of a support system because there is no efficiency gained as the number of users increase. Additionally, the model does not reflect the minimum number of personnel required to maintain a LAN.

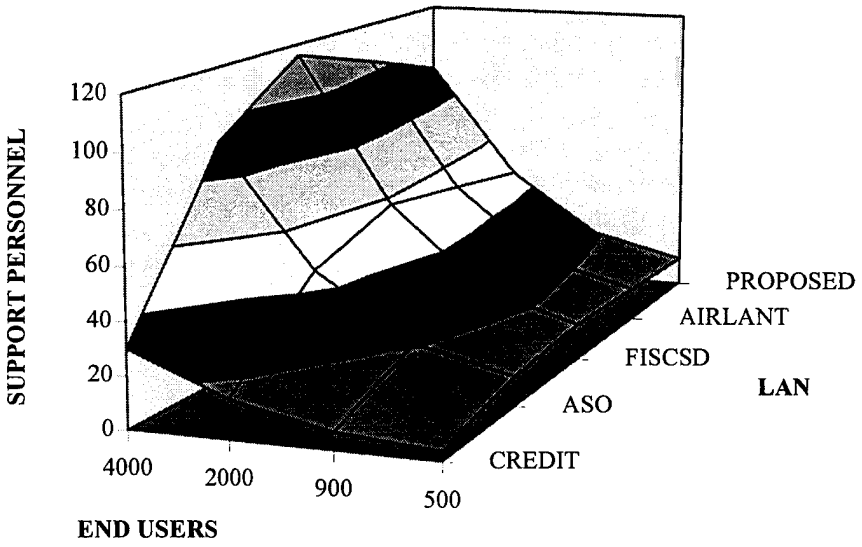

Figure 5. Support Personnel Per End User

E. PROPOSED STAFFING

The following is a list of the personnel I believe would be necessary to support a FISC LAN with approximately 1,000 end users:

1. Chief Information Officer

- One military officer or a GM schedule employee.
- This position should not be outsourced to a contractor. This is the Chief Executive of the department and the direction and commitments of the department should represent the goals of the government.

- In addition to the duties outlined in this chapter under Table 2, this officer should monitor and set the goals for every significant aspect of the CIO Department.

2. Administrative Assistant

- One military officer or GS employee.
- Responsible for assisting the CIO in the administration of the department.

3. Security Manager/Budget Manager

- One GS employee.
- This should be a GS employee to provide continuity in both the budget process and in the general policies for operating the LAN.
- In addition to the duties in this chapter in Table 2, Management and Budget, this employee is responsible for security on the LAN and LCM functions.

4. Operations Manager

- One military officer, GS employee or contractor.
- Responsible the management of the duties outlined in Table 6, Operational Services Tasks in this chapter.

5. Help Desk Personnel

- Two GS employees or contractors.
- Responsible for performing the duties outlined in this chapter under Operational Services and the Help Desk in Table 6, Operational Services Tasks in this chapter.

6. Training Personnel

- Two contractor personnel.

- By staffing with contractor personnel, it will be possible to reduce the support for training after the initial establishment of the CIO Department.

- Responsible for performing the duties outlined in Table 8, Training Tasks in this chapter.

7. Network Administrators

- Two GS employees or contractors.

- Responsible for performing duties outlined in Table 4, Network Support Services Tasks in this chapter.

8. Configuration Support Personnel

- One GS employee or contractor.

- Responsible for performing duties outlined in Table 7, Infrastructure Support Services Tasks, specifically assigned the tasks involving configuration management and inventory control.

9. Security Support Personnel

- One GS employee or contractor.

- Responsible for performing the duties outlined in Table 6, Operational Services Tasks, specifically assigned the tasks that involve LAN security.

10. Technical Services Manager

- One GS employee or contractor.

- Responsible for managing the tasks outlined in Table 7, Infrastructure Support Services Tasks.

11. Field Service Personnel

- Three GS employees or contractors.

- Responsible for performing the tasks outlined in Table 7, Infrastructure Support Services Tasks.

12. Systems Support Personnel

- One GS employee.
- Responsible for the tasks outlined in Table 3, Systems Support Services Tasks.
- This position may or may not be staffed. Initially, the position would consist as a liaison between DISA and the FISC. As NAVSUP moves database access for the FISC from Tier I to Tier II, this position may be removed and these tasks transferred to application development personnel. During the transition period, this position would be the spokesperson for the FISC in the design of the Tier II, Tier III client-server architecture.

13. Application Development Personnel

- Six GS employees or contractors.
- Responsible for the tasks outlined in Table 5, Application Development Services Tasks.

F. SUMMARY

This proposed staff tasks is based on the support currently present at FISC, San Diego. The number of personnel is a mixture of the staff used by ASO running an open system and the credit card agency which operates a closed system. The ratio of support personnel to end users approximates the ratio for the support at ASO. See Figure 4.

V. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

The author's observations of the four systems surveyed in Chapter II generated an hypothesis that open systems require more support personnel than closed systems. In looking at the support staff to end user ratios of the credit card company versus ASO, the credit card company achieves a much higher ratio and this can be attributed to the closed system that they operate.

Standardization of equipment and software can also reduce the number of support personnel required per end user. Once standard equipment and software is established throughout the operation, less extensive experience and knowledge are required to support the end users. Software standardization allows the support personnel to focus on supporting one standard set of tools for the end users and also allows the support staff to develop experience on that set of tools which leads to a more rapid resolution of trouble calls for the end user.

Hiring already trained end users experienced with the COTS software used on the LAN will reduce the initial training costs to the organization. Additionally, the hiring organization will not lose employees who have had their skills upgraded at the organization's expense and who leave for a better position.

In the author's opinion, the FISC will be able to successfully move to a more closed system because the actual tasks performed by end users in the FISC are repetitive. The FISC should develop programs which support the end users and close the system. These programs will provide the end users with single step solutions to their needs. Although this closes the system from the point of view of the support staff, it should give the end users a much more efficient method of meeting their requirements.

B. RECOMMENDATIONS

- The FISC should move to a more closed system - currently, the FISC treat all end users the same and make all resources and capabilities available. However, only a small percentage of end users require these resources. The cost of support is directly related to the openness of the system.

- The FISC should hire personnel who are already qualified - this will reduce training costs and lead to a lower rotation of employees.

- The FISC should standardize software - standard software packages are easier to support.

- The FISC should develop software for their end users - this will assist the FISC to close the system and improve the efficiency of the end users. This software must be developed by the FISC because they have the closest communication with the end users.

- NAVSUP should coordinate the development of local applications - since locally developed software is developed for end users, it is possible to reduce duplicate effort by establishing a configuration management system in common with all the FISCs so that suggestions for modifying the system or improving it can be distributed.

This study was limited due to time constraints. A more thorough study of a larger number of LANs would better justify the conclusions involving closed systems and standardization. This study could develop a metric to measure the support requirements for a range of closed to open systems. This metric could be used to staff any particular LAN depending upon the degree of openness desired. Of the four systems surveyed in Chapter II, only the credit card company demonstrates an extreme for this scale. The other systems have various degrees of openness and restrictions on the end users.

REFERENCES

1. Base Level Computing Support Services (BSS) Project, Draft BSS Project Report, FISC Norfolk, NAVSUP, June 1995.

2. Technical Support For The Naval Supply Systems Command, Information Support Structure Strategic Plan, Prepared for Naval Supply Systems Command, November 1990.

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